# PERFORMANCE-BASED LIFE CYCLE PRODUCT SUPPORT STRATEGIES: ENABLERS FOR MORE EFFECTIVE GOVERNMENT PARTICIPATION

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Organic government-owned and -managed *product support* organizations are often viewed as less capable than their commercial counterparts. In fact, highly effective government organization participants in product support do exist, supported by a host of success enablers in use at government-owned and -managed organizations across the Services. These enablers can stimulate best-value participation by government organizations in performance-based life cycle support strategies. More effective government participation results in increased synergy and collaboration for the warfighter, the organic structure, and the taxpayer. This article documents and describes some of the success enablers used to catalyze more effective integration of the government-managed support structure into the industrial base.

**Keywords:** *Product Support, Product Support Strategy, Life Cycle Product Support Strategies, Performance-Based Logistics (PBL), Product Support Assessment, Sustainment Support, Contractor Logistics Support, Award Fee, Contract Incentives, Interorganizational Success*

*image designed by Tia Gray »*

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# BLENDED DoD-INDUSTRIAL PRODUCT SUPPORT STRATEGY

In 2009 the Department of Defense (DoD) published a report on *Product Support Assessment* (DoD, 2009), with particular emphasis on DoD's vision for improving the integration of government-owned and -managed capabilities into performance-based product support strategies. Rather than treating the government share of the industrial base as distinct from the commercial base, the report develops and posits the notion of a single industrial base, partially managed by the government and partially managed by the commercial sector; and that the government participants can be best-value participants. The vision for industrial integration strategy uses this foundation to speak to the opportunity for synergy from a more collaborative organic and commercial industrial base.

Effective product support requires contributions from both the public and private sectors. A significant challenge over the course of the next decade, particularly in today's acquisition environment of declining financial resources combined with projected deficits and undiminished operational demands, is creating a more effective, unified, and fiscally prudent industrial integration strategy for product support. More than 60 years after World War II (WWII), when the standing commercial industry (still seen today) originally spurred the post-World War II economic boom, the DoD has yet to fully leverage and blend the knowledge, skills, and capabilities of the complete defense industrial base through a considered and deliberate integration strategy.

As a part of the continuing efforts to achieve acquisition reform, Congress has passed legislation better defining the role of government entities involved in executing product support strategies. The government has always been fully responsible and accountable for product support delivered to the warfighter. That principle has been reinforced with the passage of the National Defense Authorization Act of FY 2010 (NDAA, 2009). Section 805 of the NDAA adds clarity to and elaborates on this principle.

The provisions of Section 805 require that the Secretary of Defense issue guidance on life cycle management and the implementation of product support strategies for major weapon systems. Additionally, each major weapon system shall have a product support manager to develop, implement, and validate the *product support strategy* (e.g., Performance-Based Logistics [PBL], *sustainment support*, *contractor logistics support*, life cycle product support, or weapon system product support).

The responsibility for the product support strategy is clearly in the hands of the government. In addition, most government participation in product support is more expansive than oversight. Some product support *must* be performed by the government. To cite two

common examples, either statutory requirements or operational requirements in forward-deployed environments dictate execution of certain tasks by the military. Other examples demonstrate that government organizations are best-practice contributors to product support because their role and participation are driven by best value, not statutory requirement.

Across the landscape of performance outcome-based product support strategies, numerous examples illustrate the adoption of best practices that allows government-owned and -managed capabilities to participate in product support strategies as best-value contributors. These examples demonstrate an ability to overcome commonly cited obstacles to participation by government elements and execute a more successful integration of the organic assets into a unified industrial base. Although it is true that government organizations are not *profit-making* businesses, they are businesses, nonetheless, and can successfully compete and win in PBL using best-in-class practices.

In this article, we will examine four distinct case studies that demonstrate a spectrum of viable practices available to government organizations to allow them to compete on merit for business as product support integrators and product support providers. A description of the four case studies follows:

> Case Study No. 1: An Environment of Success, Huntsville
>
> Case Study No. 2: From Source of Repair to Business Partner, Jacksonville
>
> Case Study No. 3: The Joint STARS Contract–A Decade of Success
>
> Case Study No. 4: The Upstarts–Naval Surface Warfare Center, Crane Division

The foundational development of core competencies through the incubation of best-practice capabilities, as envisioned in 10 U.S.C., Section 2474, makes this possible (Armed Forces, 2004):

> The Secretary of Defense shall establish a policy to encourage the Secretary of each military department and the head of each Defense Agency to reengineer industrial processes and adopt best-business practices at their Centers of Industrial and Technical Excellence in connection with their core competency requirements, so as to serve as recognized leaders

in their core competencies throughout the Department of Defense and in the national technology and industrial base.

From a financial standpoint, effective, efficient, and best-value use of government-owned resources is a victory. The U.S. taxpayers have a huge, long-standing investment in government-owned support capabilities, particularly in inventory control, distribution, and maintenance depots. At the same time, although the government-owned and -managed base contributes significantly, it cannot do all of DoD's product support work. American industry provides a source of innovation, and flexible and productive capacity for the defense industrial base. The way ahead for more cost-effective product support lies in effective blending of these complementary capability sets where the best use is made of the entire industrial base, facilitated by the continuing expansion of best business practices in both the commercial and government sectors.

We should not lose sight of the fact that more effective government participation in DoD's product support strategies will result in better collaboration and synergy among the warfighters, the organic structure, and U.S. taxpayers.

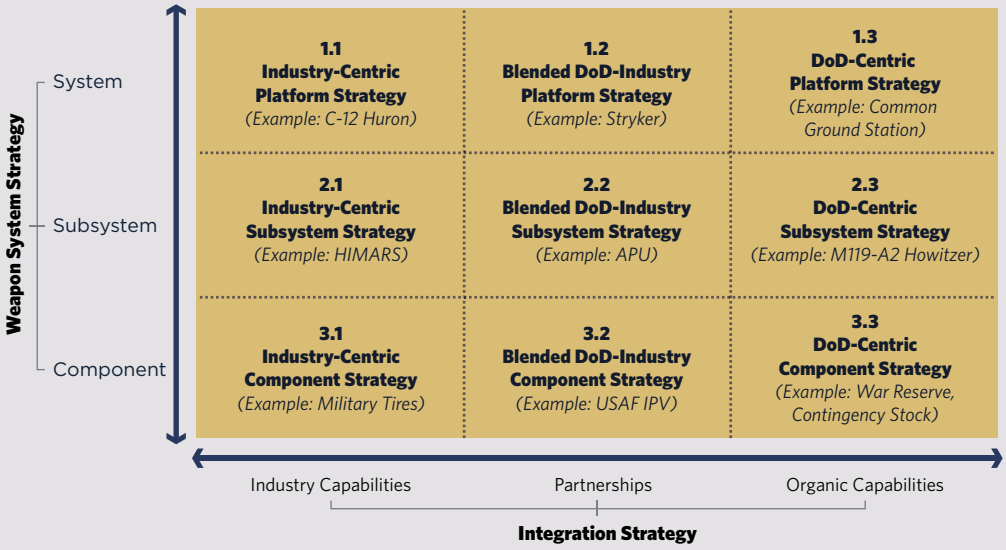
## Method

The study team followed a simple three-step process to produce the resultant case studies. The first step consisted of identifying candidate programs with characteristics that were germane to the research objectives. The second step was researching and interviewing representatives from the candidate programs. The final step included analyzing and writing the study findings that form the basis of this article.

To identify and select potential candidate programs for this study, the team used two primary criteria and one limiting factor. The primary criteria are the location in the Decision Matrix for Product Support, or DMPS (Figure 1) and distinctive performance. In selecting the programs to review, the limiting factor was the availability of program sustainment teams to support the inquiry. The team looked across the Services and at end-item operating environments (land, sea, air, and space) as a consideration in the selection of candidate programs to include.

Understanding how the candidate programs populate the DMPS in Figure 1 enabled the team to base the selection decision on the characteristics of the product support strategies from an objective perspective. In short, the DMPS was designed to help program man-

**FIGURE 1. DECISION MATRIX FOR PRODUCT SUPPORT**




*Note.* Adapted from *DoD Weapon Systems Acquisition Reform Product Support Assessment*, Department of Defense, 2009, p. 46. Retrieved from https://acc.dau.mil/CommunityBrowser.aspx?id=328610. HIMARS = High Mobility Artillery Rocket System; APU = Auxiliary Power Unit; USAF IPV = U.S. Air Force Industrial Prime Vendor.

agers identify their product support strategy. A program's location in the matrix will influence decisions relative to the Product Support Integrator (PSI) composition, metrics, incentives, Performance Based Agreement (PBA), and analytical tools. The matrix is based on a framework that outlines nine product support options as defined by the intersection of two key strategic system characteristics that drive the appropriate support strategy. The key strategic system characteristics are weapon system strategy and integration strategy (DoD, 2009). The two characteristics are useful mechanisms to categorize programs so that the team can focus on only those programs that are in line with the study objectives.

Figure 1 is also used to identify those programs with "blended" integration strategies. From the population of programs with a "blended" integration strategy, the team looked for programs from each of the weapon system strategies. With the limiting factor of program availability, the study team was able to identify candidate programs in two of the three weapon system strategy categories of subsystem and system.

From this list of candidate programs, the study team next looked for discriminating factors to identify five or six programs that formed


*Figure 2.* A U.S. sailor assigned to the aviation intermediate maintenance department's jet shop watches during a jet engine test cell on an F404-GE-400 jet engine for an F/A-18C Hornet aircraft on the fantail of aircraft carrier *USS Nimitz* (CVN 68), October 14, 2009, in the Indian Ocean. The F404 engine has twice won the Department of Defense Performance-Based Logistics Award. U.S. Navy photo by MC3 John Phillip Wagner Jr.

the target programs to review. Discriminating factors included recognition of excellence (DoD PBL submission packages), duration of current "blended" product support strategy, "commerciality" of the materiel, and ongoing research efforts at Redstone Arsenal, Alabama.

The selection process, in conjunction with program availability, resulted in the selection of three programs for the research and interview step. The study team gathered information on the programs and traveled to the program offices, depot business offices, and remanufacturing facilities to interview the managers and artisans involved in each project. The team also incorporated organizational team climate, based upon related research between Auburn University and U.S. Army Air and Missile Command (AMCOM) in Huntsville, Alabama.

With the time available, the team was able to perform a "deep dive" on the F404 engine, which has twice won the DoD PBL award (Figure 2). Product support awards are a result of the remanufacturing activity at the Fleet Readiness Center, Southeast (FRCSE), and subsystem inventory management at the Defense Logistics Agency.

## Case Study No. 1: An Environment for Success, Huntsville

The U.S. Army AMCOM has created an environment of high-performing, award-winning product support teams. Huntsville organizations have earned recognition for their performance-based product support initiatives. Specifically, a number of Huntsville programs have won the annual Secretary of Defense Award for Excellence in PBL, as follows:

2005 Shadow 200 Tactical Unmanned Aircraft System

2006 High Mobility Artillery Rocket System

2007 Improved Target Acquisition System

2008 Tactical Airspace Integration System

2009 High Mobility Artillery Rocket System

In fact, this is the complete list of PBL Award winners for the Army, and every one of these award winners is at Huntsville. No Army competitor for the PBL Award has ever won the competition from any location other than Huntsville. According to the 2009 PBL Award memo:

> *Performance-Based Logistics (PBL)* is the Department of Defense's strategy to improve weapon system readiness by obtaining life cycle product support of weapon systems, sub-systems, and components as an integrated package based on output measures, such as materiel availability, materiel reliability, and reduced ownership cost.
>
> The Secretary of Defense PBL Awards recognize government and industry teams that have demonstrated outstanding achievements in providing our warfighters with exceptional operational capability through PBL agreements. (Carter, 2009)

What makes Huntsville distinctive? How can it so completely dominate as the Army's leader in PBL? What special enablers are present in the Huntsville environment? Why is Huntsville so successful in driving outcome-based product support strategies that maxi-

mize contributions from across the industrial base (Haynie, Randall, Armenakis, & Geary, 2009).

In this phase of the research, we sought to understand and identify the practices that contribute to this high performance. Accordingly, we interviewed team members from many of the high-performing product support teams from AMCOM, including many of the award winners. These interviews included personnel from both government and industry who were involved with post-production support of U.S. and allied defense systems. We ensured that our interviews included strong government participation by conducting interviews with personnel from Apache, Letterkenny Army Depot, Close Combat Weapon Systems, Corpus Christi Army Depot, Unmanned Aerial Systems Logistics Division, the Integrated Materiel Management Center, and the Precision Fires Project Office.

Through discussion during site visits, we attempted to understand what behaviors and perceptions led to success. Those we interviewed gave us a rich perspective of the inter and intraorganizational behaviors that appear to foster PBL success.

We found individual behaviors and organizational processes were consistent with suggestions in supply chain research on how to improve collaborative performance. What we found was that AMCOM appears to have fostered a PBL culture that aligned and oriented those behaviors and processes. The orientation created through a proactive PBL strategy appears to positively influence cost control and performance improvement in the eyes of the managers. The strength of performance-based support strategies seems to be their ability to strategically align cross-functional and interorganizational processes of multiple firms, customers, and bill payers; and focus them on a long-term performance goal in a manner that creates consistent and measurable success. The review of the environment at Huntsville was not intended to validate the efficacy of their performance-based approach. Rather, given the numerous PBL Award winners from Huntsville, the research uncovered eight factors critical to enabling an environment for success.

### *Eight Critical PBL-Driven Interorganizational Success Factors*

In effect, adoption of a performance-based product support approach represents a strategic change in interfirm practice. By analyzing teams that implemented this new strategy of outcome-based product support, we found key enabling factors present in the environment that contributed to the successful participation in, and often leadership of, outcome-based programs by government organizations.

The eight factors identified at Huntsville include:

***FACTOR NO. 1***

Cooperative Interdependence. Cooperative interdependence is an understanding that goal attainment is dependent upon other team members reaching their goals (Deutsch, 1973).

***FACTOR NO. 2***

Transformational Leadership. Transformational leaders transcend short-term goals (Eisenbeiss, Van Knippenberg, & Boerner, 2008) and focus their attention on the higher order intrinsic needs of subordinates, inducing them to transcend their own self-interests for the benefit of the organization or team.

***FACTOR NO. 3***

Team Climate for Innovation. Team vision, participative safety, climate for excellence, and support for innovation are components in the creative process, leading to greater team innovation (Deutsch, 1973).

***FACTOR NO. 4***

Team Innovation. Team innovation is the combination of the quality and quantity of creative ideas that have been implemented within an organization. These innovations represent changes and can be either administrative or technological in nature (West, 2002).

***FACTOR NO. 5***

Team Learning. Team learning is the process by which teams discuss and solve problems. Collectively, the team engages in information seeking and reflective decision-making processes that positively impact the degree of knowledge and information for other members (Hirst, Van Knippenberg, & Zhou, 2009).

***FACTOR NO. 6***

Team Performance. Objective performance represents the outcomes of the team's activities that are valued by one or more of its constituencies, such as reductions in operating costs, greater efficiency, and increases in profits (Mathieu, Maynard, Rapp, & Gilson, 2008).

***FACTOR NO. 7***

Change Appropriateness. Innovations can produce desired outcomes such as increased product quality and reduced support costs. However, it is important that the appropriateness of the innovation be taken into account; unbridled innovation can be counter-productive (Armenakis, Harris, Cole, Fillmer, & Self, 2007).

***FACTOR NO. 8***

Means Efficacy Climate. Means efficacy climate is the shared attitude concerning the degree of organizational support supplied to the team through policies, processes, and procedures (Eden, 2001).

These enablers are not new. They are described and validated in the more generalized academic literature related to management and change management. What is new is the manner in which these factors interrelate under a PBL strategy to create an environment whose whole is greater than the sum of its parts. Our findings demonstrate how a proactive PBL strategy provides a benchmark of management best practices.

To close the loop, the research team conducted validation sessions with senior executives, senior managers, engineers, program managers, and logisticians familiar with performance-based strategies. The subject matter experts confirmed that, from their perspective, the data, analysis, and identified factors fit with their environments.

*Implications for Outcome-Focused Product Support Success*

The AMCOM has a culture of demonstrating innovation and leadership when it comes to post-production support. Our research suggests that an organization-wide understanding of the eight factors that interrelate to create a winning culture drives success. These factors have evolved and emerged at Huntsville largely because they have been able to create a collaborative partnership approach. This partnership extends across the organization and into partners in the industrial base and is less adversarial in style, based on a mutual understanding of where the motivations and interests of each party lie. By acknowledging and managing areas of divergence and tension, and supported by a willingness to share information in a spirit of openness and transparency at all levels, the partnership philosophy becomes a key competency. Creation of that environment must take place within the government post-production support infrastructure, culture, and resources in order to drive PBL. The AMCOM in Huntsville identifies and demonstrates the elements that are best practices.

Expanding the role of DoD's government-run sustainment infrastructure (e.g., depots) presents challenges in the planning for, and delivery of, integrated, affordable, outcome-focused product support. What Huntsville demonstrates is that, regardless of the obstacles, critical success factors are known and are within the control of those leaders responsible for the government's post-production support infrastructure. Good management drives performance-based success; this, in turn, leads to a win for the warfighter, the organic structure, and the taxpayer.

## Case Study No. 2: From Source of Repair to Business Partner, Jacksonville

*Jacksonville's Journey*

"We provide aviation maintenance solutions that satisfy Navy warfighter's demands," according to the FRCSE mission statement. Actually, from a review of two product support efforts, the FRCSE, located in Jacksonville, Florida, is evolving by leveraging its robust manufacturing capability and forward-leaning business practices that help position existing capacity for use in partnerships. The new development is the extent that FRCSE and its private-sector business partners have aligned their respective business models to create a blended and compelling value proposition for the warfighter.

Like Huntsville, Jacksonville has created an innovative environment where the adoption and application of best commercial business practices have been embraced. The discovery work at Huntsville included a detailed validation of the elements required to develop a working environment, receptive to the adoption of best practices in support of performance-based life cycle product support. Rather than replicating Huntsville, the review in Jacksonville focused on the implementation of specific best practices themselves.

High-visibility, performance-based product support strategies are currently in use by several programs in Jacksonville. The two product families that participated in the research are the F404 and F414 engines, used on the F-18 aircraft; and the Forward Looking Infrared family of sensors, used on a variety of platforms. Meetings took place with the FRCSE business office, as well as company representatives from General Electric Aircraft Engines (GEAE) and Raytheon, the respective Original Equipment Manufacturer (OEM) and business partner on these programs.

*Foundation*

For both of these programs, the following four solid foundational elements of performance-based product support set down in the public-private partnership fully align with the description offered in the Product Support Assessment (DoD, 2009).

***ELEMENT NO. 1***

*Long-term committed relationships executed* with flexibility and integrated across organizational boundaries, with complementary skill sets and abilities, are both essential and possible.

***ELEMENT NO. 2***

*Shared partnership vision and objectives with the right metrics and incentives* drive alignment and are especially effective when supported by a clear delineation of complementary roles and responsibilities.

***ELEMENT NO. 3***

*Full coordination with all stakeholders* supported by transparency, open communication, and the flexibility to change partnership scope is an essential ingredient to success.

***ELEMENT NO. 4***

*Clearly documented objectives* support alignment and fuel the success of the partnership. This can be achieved through incentives that drive desired outcomes and are supported by sound economic analysis.

Nothing new or particularly innovative is embodied in these foundational elements of performance-based product support. The Government Accountability Office (GAO, 2003) first documented the essential elements. What is interesting at Jacksonville is the distinctive degree of integration and coordination they have established on top of this foundation.

*Beyond Transactional Approaches to Maintenance, Repair, and Overhaul: Moving From Wrench Turning to an Integrated Business Model*

One of the recommendations of the Product Support Assessment (DoD, 2009) speaks to the vision of leveraging government-managed,

post-production support capabilities outside of the traditional, program-centric events:

> ...Expand partnering 'beyond maintenance,' drive standardization across Services, and promote proactive establishment of single-source repair capability. (p. 43)

At Jacksonville, we see in execution a prototype defense industrial base of the future. Here, a government-run depot support operation has moved beyond a job-shop maintenance operation, becoming a fully capable industrial partner that is deeply integrated with commercial partners. The partnerships that are being created provide the government customer with a unified government and industry post-production support effort. The individual activities in large part are not distinctive, but the degree of integration and coordination is.

In the engine shop, under one roof, the Jacksonville support operation maintains engines from two different OEMs. Integrated processes and shared capacities support both OEM families, managed by a unified staff. Through this Navy capability set, it also maintains engines for the A-10 aircraft—an Air Force platform. The Jacksonville operation is moving inexorably down the path of managing its engine maintenance capability in a standardized fashion across product families, and indeed across Services.

Its success has led to the capture of additional work from GEAE, formerly performed at the GEAE facilities north of Boston. This is the typical pattern of success in the maintenance arena for depot partnerships. Yet, in Jacksonville, this accretion of additional work has created an opportunity to move beyond legacy maintenance functions. The facility is now being audited by GEAE to become, in addition to the current role as a source of repair for the 404 and 414 engines, a new module manufacturing site for the 414 engine.

The FLIR team, including both Raytheon and the FRCSE, also demonstrates highly evolved thought beyond the traditional maintenance partnership roles. In discussions, they clearly draw a distinction between maintenance partnerships and business partnerships; for the FLIR sensors, the team maintains that they are in a business partnership and that they have moved beyond wrench turning a long time ago.

The original PBL in the FLIR family was for the device on the H-60 helicopter. Rather than viewing this as a unique opportunity, first Raytheon, and then Raytheon in partnership with the FRCSE, saw this as a competitive opportunity to capture more work. Over time, capacities and equipment were upgraded in Jacksonville. With Raytheon as the prime and the FRCSE as a teammate and subcontractor,

the team competed for and earned additional work. Today, a single set of equipment in one government building services a diverse set of FLIR devices.

A breakthrough took place in 2009. The capacities in Jacksonville were purposely designed to be able to accommodate the FLIRs installed on the Air Force's Predator and Reaper Unmanned Aerial Vehicle platforms. The ability to maintain these FLIRs is a core requirement, meaning that the DoD is statutorily required to maintain government post-production support capability. The Navy's FRCSE was selected by the Air Force as the Depot Source of Repair for the Predator and Reaper FLIRs. The complete set of FLIRs that are now slotted to use this capacity are AAS-44V (older H-60 series), AAS-44(C)V (MTS-A for H-60R/S), AAS-52 (MTS-A for Predator), DAS-1 (MTS-B for Reaper), AAQ-27 (MV-22), and the AAQ-29 (CH-53E).

By viewing themselves as an integrated capability set, the FRCSE and various industry teams have been able to step beyond traditional program-centric maintenance relationships. They are now integrating horizontally across the portfolio, and they are integrating across the Services. The government's post-production support capabilities, developed under the umbrella of Section 2474 and nurtured by their industry partners, are stepping into higher level activities like new module assembly. Private industry has been instrumental in directly assisting the incorporation of these best practices into this public facility, and together the team is reaping the benefit. They are bootstrapping themselves through an evolutionary process toward becoming a single-source capability for specific technologies used across the Services.

### *Enabling Best Practices*

The FRCSE has demonstrated an ability to deploy a broader approach to partnership that is not the typical public-private partnership based on arms-length arrangements. This, in turn, has allowed industry to look to the government post-production support infrastructure for a capability that is sought by the industrial base. With the jet engine, that means the FRCSE can provide jet engine fabrication and assembly expertise, not just artisan labor. For the FLIR, it means the FRCSE has off-the-shelf, one-stop capacity and capability to perform maintenance, repair, and overhaul on a technology that is becoming more and more ubiquitous and sophisticated across military weapon systems.

This evolution did not happen overnight. According to the research participants familiar with the progression, the team built a foundation of business partnerships based upon a common strategic vision. Each party identified their revenue streams and began work-

ing toward a "business" relationship that addressed the needs of each participant. This developmental process spanned years.

These needs are different from the point of view of Jacksonville and the industrial partners. For the industrial partners, the definition of need is simple: profit. Real dollars flowing to the bottom line matter to commercial organizations. On the other hand, the government depots, and other post-production support organizations, are "break even" operations. The FRCSE looks at sustaining or increasing labor hours, avoiding Base Realignment and Closure recommendations, satisfying statutory requirements (core, 50/50, etc.), and improving support of the fleet as "profit."

Rather than clashing over the differing needs, the FRCSE has found common ground that allows it to operate in understandable "swim lanes" with its industrial partners. The FRCSE lauds industry's superior ability to manage component supply more effectively, and unhesitatingly turns to industry to contribute. Other areas where the FRCSE accepts help are: technical data, information systems, test, training, technical assistance, transportation, packaging, engineering analysis, inventory management, quality support, logistical services, materiel movements, and engineering on the shop floors. Although the FRCSE and its industrial partners are grappling with a complicated set of best-value decisions, none of them retreat from making the hard business decisions.

Motivated by self-interest, FRCSE and its partners have maneuvered themselves into a position where they focus together on the joint opportunities and seek to grow the business and consequential benefits to each party. This is an extremely sophisticated, strategic approach to business. Or, as one industrial partner described the process, they worked diligently to "put the depot in a position that they would have to make a bad business decision by not forming a true business partnership."

In conjunction with the development of a shared strategic vision, the government post-production support activities implicitly adopt a mindset that drives alignment to the desired outcomes. The introduction of performance into the equation encourages the OEMs to competitively seek to meet the benchmarks, and to find partners who can help them do it. This, in turn, encourages the government post-production support organizations to improve in areas where they have competency, thereby making them more attractive to the OEMs. This creates a positive, perpetual cycle that drives best practices into the government post-production support organizations, all resulting from the embrace of a shared strategic vision.

Highly visible indicators are evidence of the depth of alignment and integration between commercial partners and the government post-production support industrial base. Technical employees of the commercial

partners are embedded within the government post-production support operation, including on-site offices and free access to the workspaces of the artisans. The FRCSE has embraced Lean and Six Sigma approaches to continuous improvement. Bulletin boards are prominently displayed with objective performance measures so all employees can see what they are being measured against.

Further, contrary to conventional wisdom, artisans can earn incentive payments based on their performance. In the contemporary financial environment, cost reduction is an imperative in any PBA. So, although the FRCSE works on a cost-reimbursable basis, it has put in place a very aggressive gainsharing program with the artisans—in a union environment no less. A "controllable" hourly labor cost is defined for each work center, and 40 percent of any achieved cost reduction against that rate is paid to the employees. For reimbursement purposes, the depot can still invoice for the incentives paid, because the bonuses are considered labor cost, but the achieved hourly cost reduction rolls into the controllable hourly rate for the next reporting period.

### *Open Issues*

The FRCSE follows conventional government business practices, which rely on cost-reimbursable contracts. However, it can become more completely integrated into a singular industrial base by acting like its partners and using a contract vehicle called firm fixed price (FFP). The definition of an FFP is derived from the Federal Acquisition Regulation (FAR, 2005):

> A firm-fixed-price contract provides for a price that is not subject to any adjustment based on the contractor's cost experience in performing the contract…It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon the contracting parties. The contracting officer may use a firm-fixed-price contract in conjunction with an award-fee incentive (see 16.404) and performance or delivery incentives (see 16.402-2 and 16.402-3) when the *award fee* or incentive is based solely on factors other than cost. The contract type remains firm-fixed-price when used with these incentives.

This contract type can be a contentious issue. Although an FFP may align depot incentives with performance objectives, similar to FFP use with a contractor, an FFP contract with the depot would shift a burden of risk to the depots. Historically, this is not an area of risk that the depots have had to assume. On the other hand, an FFP

could open up opportunities for the government operation to leverage incentives and reduce costs.

According to the Office of the Naval Air Systems Command (NAVAIR) Comptroller, "Sales of DoD goods and services to private-sector entities on a fixed-price basis are authorized when the work is well defined and there is a reasonable basis upon which to predict costs" (DoD, 2005). This is analogous with private-sector practices, improves the ability of private-sector partners to predict production costs, and serves to constrain unit cost by more fully utilizing the production capacity of DoD maintenance depots. Cost-reimbursable pricing is appropriate when future production costs cannot be reasonably predicted (Camacho, 2008).

Through participation in an FFP, the government post-production support organizations would create an opportunity to positively influence Net Operating Result over the life of the contract; this is the other side of the risk coin. However, if success under an FFP occurred, the FRCSE would "earn" funds to invest in capital equipment: variances can be reinvested in the depot. This could create a funding source to facilitate earlier standup of depot capabilities and

*Figure 3.* A U.S. Air Force E-8C Joint Surveillance Target Attack Radar System (Joint STARS) aircraft assigned to the 128th Expeditionary Air Command and Control Squadron. The Joint STARS is a battle management and command and control aircraft that tracks ground vehicles and some aircraft, collects imagery, and relays tactical pictures to ground and air theater commanders. U.S. Air Force photo by SSgt Aaron D. Allmon II.

facilitate the establishment of a single authoritative source of depot repair for the programs.

Finally, no single business office spans the Navy post-production support capabilities, or even the depots themselves. Each depot maintains its own business office, using policies and practices in line with the commander's intent for that installation. While this maximizes flexibility at the operating level, it complicates efforts to deliver needed standardization and reforms.

The existence of open issues serves to illustrate that more effective collaboration across the industrial base, spanning government and industry resources, is a continuing work in progress. Partnership at the strategic level is possible, and Jacksonville, just like Huntsville, is building an organizational climate that drives success. And, as we continue to see across our case studies, more effective government participation is mutually beneficial for the warfighter, the organic structure, and the taxpayer.

## Case Study No. 3: The Joint STARS Contract—A Decade of Success

The E-8 Joint Surveillance Target Attack Radar System (Joint STARS) is a U.S. Air Force airborne battle management command and control, intelligence, surveillance, and reconnaissance platform (Figure 3) that conducts ground surveillance to develop an understanding of the enemy situation, and supports attack operations and targeting that contribute to the delay, disruption, and destruction of enemy forces.

Product support is provided through a Total Systems Support Responsibility (TSSR) contract, with Northrop Grumman Corporation designated as the PSI. From its inception, the Joint STARS TSSR contract—first awarded September 15, 2000—has been recognized as a pathfinder in the Air Force. The Under Secretary of Defense for Acquisition, Technology, and Logistics selected the Joint STARS Future Support Team to receive the David Packard Excellence in Acquisition Award. At the time, a Defense Contract Management Agency spokesman said, "This innovation sets a benchmark for partnering with industry and leverages that relationship to increase weapons system availability while reducing operating costs."

The Joint STARS TSSR Program Management Team, located at the Warner Robins Air Logistics Center (WR-ALC), provides program oversight. Northrop Grumman has the responsibility, authority, and accountability for the majority of day-to-day sustainment. Specifically, Northrop Grumman is fully accountable for OEM and vendor

tasks, depot performance under a workshare agreement, and management of platform-unique items. The government manages and executes product support for the engine, common repairables, common consumables, and common support equipment.

Depot and depot-level repair work is executed via partnership between the government depot at WR-ALC and Northrop Grumman. Northrop Grumman performs periodic depot maintenance and modifications on Joint STARS and all software integration. Some software support is performed at WR-ALC under partnership, and Northrop Grumman executes some software support. Likewise, some prime mission equipment repair is performed by WR-ALC under partnership, while other prime mission equipment repair is handled by Northrop Grumman. The engine is managed and maintained at the Oklahoma City Air Logistics Center.

Rather than the traditional approach to TSSR, which tended to be a platform-level agreement with broad scope provided to the PSI, the government program structure maintains an active and visible role in directing, managing, and executing the product support strategy, while at the same time empowering a commercial entity as the PSI. It is an integrated approach, bringing together core competencies across the breadth of the industrial base, and tailoring the portfolio to meet the requirements of this strategic weapon system.

The net effect is an active and valuable role for the depots.

### *Enduring Performance*

The Joint STARS is a complex suite of technology riding on an antiquated airframe, the Boeing 707. Yet despite these challenges, the integrated performance of the PSI has consistently met all requirements, even though, for example, the PSI has no direct authority over depot support. Northrop Grumman, over the past 6 years, in every 6-month award period has always earned within a few percentage points of the maximum award fee available under the contract. And, in an attempt to address a common criticism of award-fee approaches, the program has defined objective criteria for setting an award fee. Since 80 percent of the award-fee recommendation is driven by specific and defined performance outcomes, clearly, the Joint STARS platform is performing to expectations.

A defined protocol for making award-term decisions also exists. Initially awarded with a 6-year base period, the Joint STARS contract was configured to allow up to an additional 2 years of contract performance, based solely on performance, during each year. As of the end of 2009, Northrop Grumman had already earned contract extensions through 2017.

*Enabling Best Practices*

The complexity of integrating a product support strategy as complex as Joint STARS into a functioning, integrated whole is considerable. To keep the program aligned, the team has brought together a tapestry of interwoven checks, balances, and incentives to drive desired outcomes. Although each of these approaches is a best practice, the integration of all of these practices into a single strategy is truly best in class.

By any benchmark in the world of product support, a base period of 6 years is long. To provide a secure umbrella under which the business partnership could flourish, the Air Force elected to look to a longer horizon. Instead of only rewarding a contractor for excellent performance with additional award fee, it rewards the contractor by extending the contract period of performance without a new competition. Under an award-term incentive, the government monitors and evaluates the contractor's performance, and if specific criteria are met, additional contract length is automatically awarded.

For Joint STARS, the base period, coupled with the opportunity for the contractor to earn an award-term incentive, leads to a total potential opportunity of 22 years to perform. The Joint STARS PSI has a powerful incentive to both perform and make life cycle decisions across a long horizon. This is yet another example of a successful best practice that could be more generally used; however, not all of the Services choose to recognize award-term contracts as an available enabler to drive performance.

It is possible, during 1 year of performance, to earn an additional 2 years of term. However, the award-term provisions cut both ways; if the PSI performs poorly, it can lose performance period. This clearly encourages consistent and reliable performance.

In many circles, private industry is reluctant to embrace workshare arrangements with depot resources, because industry has neither contractual control over the resource, nor the opportunity to earn revenue/profit on the work at the depots. At WR-ALC, a workshare arrangement is in place, but a business model has also been put in place to incentivize the PSI to influence, and hopefully drive, performance at the depots. Simply put, the PSI can earn award fee based on depot performance. This simple step makes the PSI a stakeholder, deeply invested in making the depots successful.

Deep implications are also inherent to the award-fee approach with Joint STARS. Typically, award fee is distributed based on subjective judgment. Instead of the conventional approach, the program has defined objective criteria for determining award fee. By defining specific and objective measures and using those to determine the distribution of award fee, the Air Force has driven alignment to

specific outcome criteria across the program. This is a key principle of performance-based product support.

Tools have been developed to allow the PSI to augment government organizational performance when necessary. The PSI is authorized, when requested to do so by the government, to provide common item(s) when the government item manager's estimated delivery date does not meet the warfighters' need date. The PSI is also authorized to handle surge workload and shortfalls when the capacities at WR-ALC handling repair of mission systems are unable to meet the requirement.

*Open Issues*

One of the most difficult issues in establishing long-term, performance-based contracts is the establishment of objective performance outcome measures that remain relevant, challenging, and attainable over the life cycle. Today, almost 10 years into the Joint STARS TSSR, the PSI and the Air Force are revisiting the measures used to develop award-fee recommendations. Past attempts to modify the targets have stalled because the targets are contractual terms, and any modification requires mutual consent.

The grinding requirements of ongoing operations have caused a shift in perspective. Today, warfighters express a greater interest in aircraft availability and sortie effectiveness. Consequently, the program team is working to rearrange the weights of certain governing metrics. Today, 17 metrics roll up into a final weighted score. Ideally, one of these metrics—Depot Possessed Aircraft—can be moved from 12 percent of the total to 20 percent; and Introductory Flight Training sortie effectiveness can be increased from a mere 2 percent to 10 percent. This 10-percentage-point weight shift would come by reducing the relative weight of cost measures.

The determination of what the right weights should be is a discussion best left to the team most familiar with the weapon system; and the number of measures tracked as top-level outcomes is open to debate. This process, however, highlights the need to build reset and calibration mechanisms into measurement schemes to allow outcome definitions over time.

As with the previous cases, Joint STARS has opportunities to continue with its improvement journey and deliver more effective performance. That said, the innovations we see at WR-ALC, proven over the last decade, demonstrate that enablers are available to drive best-value participation across a breadth of government resources. And, once again, we see that more effective government participation promotes increased synergy and collaboration for the warfighter, the organic structure, and the taxpayer.

*Figure 4.* An HH-60G-Pave Hawk helicopter from the 33rd Rescue Squadron (RQS) receives fuel from a KC-130J during a 3-day intensive air refueling course at Kadena Air Base, Japan. The KC-130J, which performs air-refueling missions, is a specialized version of the C-130J, a medium-range, tactical aircraft and the newest upgrade to the C-130 fleet. U.S. Air Force photo by SSgt Chrissy Best.

## Case Study No. 4: The Upstarts—Naval Surface Warfare Center, Crane Division

The C-130J is a modification of the C-130H, undertaken by Lockheed Martin Aeronautics Corporation (LMAC) as a private venture, with intended sales to the United States and various foreign markets. The C-130J aircraft is a medium-range, tactical aircraft and is the newest upgrade to the C-130 fleet. Specialized versions of the aircraft include the C-130J Stretch, which has an increased cargo floor length of 15 feet; the WC-130J, which performs weather reconnaissance missions; the EC-130J, which performs electronic warfare missions; the KC-130J, which performs air-refueling missions (Figure 4); and the HC-130J, which performs search and rescue missions.

Currently, the U.S. Government operates approximately 100 airframes, with 65 in the U.S. Air Force, 29 in the U.S. Marine Corps, and 6 in the U.S. Coast Guard; another 60 are owned by foreign governments. Historical practice would suggest that since the C-130J was built using private investment, the military would rely on a system-level, performance-based product support acquisition strategy, with the OEM as either the integrator or playing an active role in the integration. That is not the case in the Navy.

### *The NAVAIR–NSWC Crane Partnership*

The Air Force supports the C-130J under a long-term, PBL partnership among LMAC, the C-130 Program Office, and the 330th Air Combat Support Group at WR-ALC. Initially, the NAVAIR followed

the U.S. Air Force product support strategy and relied on LMAC as the source of supply for KC-130J platform-unique components. However, as operational requirements and ongoing commitments grew without proportionate additions to budgets, the Navy found itself under financial pressure. Seeking alternatives, and unable to afford the pricing available through LMAC, the NAVAIR program office opened up a dialogue with the Naval Surface Warfare Center (NSWC), Crane Division.

In collaboration with the program office, NSWC Crane began seeking alternative repair item sourcing strategies for the KC-130J. Since the C-130J is a complex weapon system, subcontractors produce many items on behalf of LMAC. Additionally, the government owned technical data for many of the components. The solution Crane offered was simple: It would replace LMAC as a supply chain integrator at the component level for the program office, and reach out directly to the supplier community. This arrangement offered the additional benefit of swift implementation without the need for a Business Case Analysis: NSWC Crane is within the same Service and can readily accept Military Interdepartmental Purchase Requests.

According to the program office, NSWC Crane has been extremely successful as an agent, driving dramatic cost reductions in costs per flight hour, and in many cases obtaining warranty coverage superior to that available from LMAC. Further, NSWC Crane is behaving entrepreneurially and, in conjunction with the program office, has identified a way to apply the next-generation business model described in the Product Support Assessment (DoD, 2009) to its advantage.

As reported by the NSWC Public Affairs Office, logistically reengineering the sustainment program and re-baselining "by the flight hour" has been successful (Camacho, 2008). NSWC Crane receives a fixed rate for each KC-130J flight hour flown and promises a specific minimum level of performance. The project team employs continuous improvement Lean tools in keeping with NSWC Crane's continual efforts to provide timely, affordable, and quality solutions to the warfighter. This approach helped increase the desired efficiencies that ultimately benefited flight-hour costing and mission capability. The minimum level of performance was set at 85 percent mission capability due to supply issues, but successfully executed in excess of 95 percent since support moved to NSWC Crane. In 2007, NSWC Crane's role in KC-130J sustainment had saved the government $42 million by reducing the cost per flight hour by nearly 75 percent from 2005 to 2007 (Camacho, 2008). More recently, according to PMA-207's APML, the relationship with NSWC Crane has yielded more reductions in operating costs. If NAVAIR had stayed with LMAC, estimates of the current cost are more than $1,000 per flight hour. At times, the

KC-130J has operated under $300 per flight hour for unique repair of KC-130J repairables.

The government post-production support element at NSWC Crane has leveraged its skill and operates as a viable competitor to the commercial OEM as a PSI on an FFP basis.

### *Open Issues*

While the strategy employed on the KC-130J is innovative and successful, there are risks. Bypassing LMAC moves NAVAIR and NSWC Crane's PBL out from under the umbrella of LMAC. To mitigate, NAVAIR contracts for technical support from LMAC through another arrangement that is managed as a part of the program portfolio. The program office has elected to retain more responsibility—and more risk—by accepting a more active and central role in the execution of the support strategy.

To illustrate the potential risks of the approach, consider the life cycle. The KC-130J is a maturing platform, and obsolescence challenges as well as diminishing manufacturing sources of supply can be anticipated. Will the program office and NSWC Crane be able to manage transitions as effectively as LMAC? Or would NAVAIR be better off by involving the OEM more directly in the PBL strategy through some sort of integrated accountability for performance and outcomes, instead of acquiring technical support in a fee-for-service arrangement? There are trade-offs, and costs to date have clearly been positively impacted by the arrangement, but as the platform matures, a strategy review may be appropriate to ensure continuing success.

As NAVAIR and the U.S. Air Force have charted independent courses, they have disaggregated the support strategy for the platform itself. The U.S. Air Force maintains a separate program office at WR-ALC, with its own strategy and portfolio of contracts. Against the imperatives of the individual Services, reasonable managers have made reasonable decisions. However, opportunities for cross-Service standardization and cross-pollination may exist.

All things considered, in a climate of increasing financial challenges the program office has answered the call for innovation and creativity. More effective government participation is possible, and it is mutually beneficial for the warfighter, the organic structure, and the taxpayer.

### *Findings and Recommendations*

The next-generation product support strategy will not deliver unless the whole community, including both government and commercial industry, is able to make the necessary changes in behaviors,

organizations, and business processes. The necessary changes, as we have shown in the case studies, include the following 10 strategies:

***STRATEGY NO. 1***

Integrating of government post-production support capabilities as best-value partners into a unified industrial base.

***STRATEGY NO. 2***

Creating the correct blend of government and industry partnership based on best value capabilities, not statutory entitlement.

***STRATEGY NO. 3***

Defining the PSI role based upon program requirements and not dogma.

***STRATEGY NO. 4***

Leveraging incentive strategies in the government-owned and -managed resources to drive down life cycle cost.

***STRATEGY NO. 5***

Capitalizing on the government post-production support organizations' ability to perform at affordable prices.

***STRATEGY NO. 6***

Creating a culture of high-performing, innovation-driven government-industry teams.

***STRATEGY NO. 7***

Sharing vision and tying that vision to objectives, metrics, and incentives.

***STRATEGY NO. 8***

Understanding all stakeholder interests and striving for win-win.

***STRATEGY NO. 9***

Seeking common ground, with a shared view of a common end customer; what unites government and industry should be stronger than what divides.

***STRATEGY NO. 10***

Understanding incentives (FFP, award term, incentive fee, etc.).

What we have seen in a crosscutting sample of government post-production support organizations' participation in performance-based *life cycle product support strategies* is that government organizations can effectively and aggressively participate and compete.

We have included examples of government post-production support organizations from each of the Services, and have taken care to include programs from a spectrum of commercial companies, including General Electric, Raytheon, Northrop Grumman, and Lockheed Martin. The examples presented demonstrate that, regardless of the perceived obstacles, determined and motivated government post-production support organizations can identify opportunities and compete effectively and successfully. What we are now seeing in the government is the emergence of competitive organizations, fully capable of participation, not as a matter of entitlement, but as a matter of competence.

Adoption of partnership approaches on a broader scope necessarily provides impetus to the cross-fertilization of best practices between industry and the government post-production support base. At the same time, there exists considerable core competency in the government community, particularly in human capital and infrastructure, which means that there should be cross-fertilization from the government post-production support base to industry. In the General Electric example, we have seen the Jacksonville FRCSE moving into a new line of business—OEM—because General Electric views the government capabilities as more cost effective than its own.

The Product Support Assessment (DoD, 2009) describes a visionary agenda for structural change to facilitate a more integrated industrial base. In fact, it recommends that DoD "Propose modifications to Title 10 to enable maximum implementation of industrial integration." The report then elaborates:

> A rethinking of the nature of partnership includes statutory requirements and issues which may impede effective and

affordable implementation of a warfighter-based product support strategy. A more consistent approach to financial rules and incentives, putting government and commercial organizations on equal footing, will inevitably lead to results that are more predictable. Revised or new statutory requirements should do three things:

1. Propose a strategy for enabling, requiring, and monitoring the ability of the Department of Defense supply chain offices and industrial activities to produce performance-driven outcomes and meet materiel readiness goals with respect to availability, reliability, total ownership cost, and repair cycle time.

2. Enable industry investment in DoD's industrial and other product support activities by submitting a legislative change to modify the government ownership requirement of depot and other support equipment and facilities used in support of core capabilities.

3. Establish reporting constructs to stimulate financial and cost reporting equivalency (i.e., comparable) between industry and the government, and require cost transparency to the greatest extent possible while respecting the need to protect competition-sensitive information. (p. 45)

As we have illustrated through the case studies in this article, an active and vibrant community across the defense industrial base is already bringing the vision of the Product Support Assessment (DoD, 2009) to life. The initiatives proposed in the report, as time has proven, eventually served as a catalyst to the community's current success.

As previously cited in the Jacksonville case study, the report also recommends, "Establish policy and training to expand partnering 'beyond maintenance,' drive standardization across Services, and promote proactive establishment of single-source repair capability." As we have seen in this report, ample opportunity and proven best practices are available to fuel this effort in the government post-production support structure.

How to interpret and apply the examples presented in this report is subjective, but within the context of establishing policy and training, driving standardization, and promoting single-source repair capability, specific actions are possible.

***ACTION NO. 1***

The Defense Acquisition University (DAU) should train leadership levels within the government post-production support organizations on how to apply the critical success factors uncovered at Huntsville and demonstrate their linkage to PBL. Leverage academic and practical expertise to provide managers, senior managers, and executives with an understanding and ability to create a team climate for innovation.

***ACTION NO. 2***

Highlight the ability of the government post-production support organizations to make use of incentives paid to hourly workers, and demonstrate how to align that with outcome-based product support strategies.

***ACTION NO. 3***

Make visible the proven utility and legality of FFP contract approaches at the depots.

***ACTION NO. 4***

Train the government post-production support organizations in identifying their core competencies, and establish business plans to grow, manage, and market these capabilities across programs and Services.

***ACTION NO. 5***

Develop case studies on taking a portfolio approach to depot standup, and build single-source repair capability from the ground up, incrementally.

***ACTION NO. 6***

Promote the long-term success of the Joint STARS program to demonstrate that hybrid approaches utilizing long-term contracts can be successful.

***ACTION NO. 7***

Provide guidelines and training to appropriate government post-production support organizations on the business opportunities available if core capabilities as a PSI for supply chain integration are developed and marketed.

***ACTION NO. 8***

Support the development of training materials and case studies at DAU based on the government post-production support organization successes documented in this report.

***ACTION NO. 9***

Create virtual business offices for each Service and a mechanism to promote standardization while leaving the resources resident in the individual commands.

***ACTION NO. 10***

Continue to drive for the adoption of performance-based product support across the enterprise, and use the examples in the report to demonstrate the opportunity that this approach provides for the government post-production support base.

Success enablers are abundant for government post-production support organizations to participate in performance-based life cycle product support strategies. It's time to spread the knowledge.

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